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## **Philosophical Transactions**

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LXXIII. *A Letter from Dr. Parsons, F.R.S.  
to Mr. Peter Collinson, F.R.S. concerning  
the Shells of Crabs.*

Dear Sir, Red-lion Square, April 22, 1752.

Read April 30, 1752. WHEN I had examined the crabs, I confess'd I had some doubts concerning them, which at present are clear'd up, by the last view I took of them. However, as I made no manner of question of the animal's casting his shell at certain seasons, your friend needed not be at the pains to quote so many authors, to prove what every naturalist knew before. I only wanted to be satisfied, that the old *exuviae* were those of the soft crab; which the mutilated claw has indeed given me assurance of, however difficult it may be to conceive the manner of his quitting it.

It is no doubt a curious specimen, and, I hope, will be very convincing to your correspondent abroad, in support of a fact, which nobody, who has any pretence to natural knowledge among us, would hesitate about; any more than we do of that animal's shaking off one or more limbs occasionally for his preservation. Nor is the manner of his acquiring a new limb in any wise different from that of his obtaining a succeeding new shell; which is from a latent organization of the part ready for being indurated in due time, after the discharge of the old one; at which time, and not before, the testaceous matter has room for its secretion thro' its proper emunctories.

This

This specimen is in every circumstance analogous to all the other animals, which annually cast their integuments ; and, in its present soft state, resembles that of a hen's egg before the testaceous matter is secreted by the glands of the membrane ; being soft and flexible : for this matter of all crustaceous animals, as well as of the eggs of fowls, is always successive to the intire formation of the membrane under it ; nor are the glands capable of admitting the *minima* of the testaceous matter, till they have grown into a state proper for that purpose.

Hence it may be concluded, that the crab, lobster, or other such animal, which has this property, are, at first, furnished with this membrane intire, and sufficient to be a defence for the creature, against the violence of the agitated waves, and the rolling of sand, gravel, or other bodies, that might prove obnoxious to it, even before it can grow hard. This seems to be the method ordain'd by the Creator for the preservation of every animal, however differing in other little circumstances. The snake, adder, lizard, or any other kinds, which we see endow'd with this property, have the new skin intire under the shrivell'd, falling, old one ; and it is, no doubt, the case with crabs, lobsters, and other crustaceous animals.

In order to throw a little more light upon this matter, it may not be disagreeable to observe the manner of the induration of the surfaces of the shells of eggs.

It has been supposed, that these consist of a *mucus* indurated upon the surface of the membrane : but this is not the case. The particles of the shelly matter

matter are solid, tho' never so minute, and are carried with the fluids of the animal to the membrane, now ready to receive them into the ducts of its glands; and are thence thrown into such order in the cellules of the external surface, as to acquire a structure no less firm, in proportion, than bricks laid on one another; and as capable of bearing any fair pressure, as a well-built arch.

When they are thus hardened and complete, they may be render'd as soft and flexible, by being macerated in vinegar, as if the shelly particles had never been placed upon them. And this is not, because the matter is quite dissolved; for a vegetable acid is not capable of making a total dissolution of it; but the minute angles are destroy'd, and the particles (which were before fix'd like wedges to each other, to which they were inevitably guided in the secretion by the very structure of the receiving cellules of the membrane) are become round, by the destruction of their angles, and admit of being roll'd in some measure upon one another, so as in the whole to yield to the natural flexibility of the membrane.

I am, with great respect and friendship,

Your most humble servant,

James Parsons.